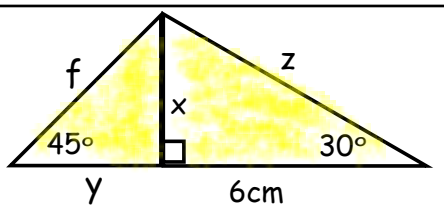
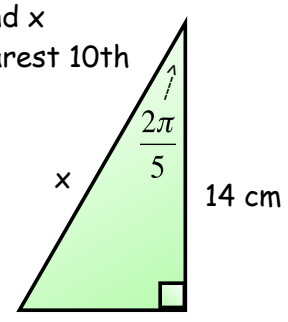
Precalc Warm Up # 4-5

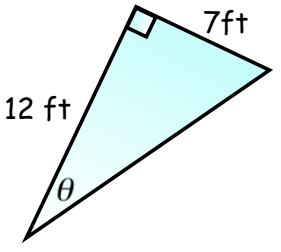
1. Find x, y, z and f exactly



2. Find x to nearest 10th



3. Find θ in degrees, minutes, 10th of a second and radians to nearest 100th.



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In Exercises 1–6, determine the quadrant in which the given angle lies. (The angle measure is given in radians.)

3. (a) $-\frac{\pi}{12}$ (b) $-\frac{11\pi}{9}$

5. (a) 3.5 (b) 2.25

In Exercises 7–10, determine the quadrant in which the given angle lies.

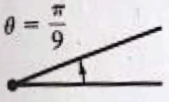
9. (a) $-132° 50'$ (b) $-336°$

In Exercises 11–16, sketch the given angle in standard position.

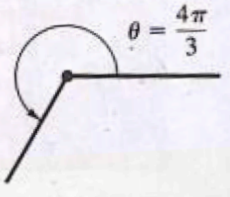
13. (a) $-\frac{7\pi}{4}$ (b) $-\frac{5\pi}{2}$

In Exercises 17–20, determine two coterminal angles (one positive and one negative) for the given angle. Give the answers in radians.

17. (a) $\theta = \frac{\pi}{9}$

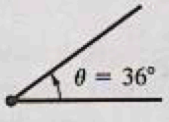


(b) $\theta = \frac{4\pi}{3}$

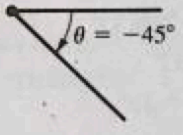


In Exercises 21–24, determine two coterminal angles (one positive and one negative) for the given angle. Give the answers in degrees.

21. (a)



(b)



In Exercises 25–28, express the given angle in radian measure as a multiple of π. (Do not use a calculator.)

27. (a) $-20°$ (b) $-240°$

In Exercises 29–32, express the given angle in degree measure. (Do not use a calculator.)

31. (a) $\frac{7\pi}{3}$ (b) $-\frac{11\pi}{30}$

In Exercises 49–52, convert the angle measurement to decimal form.

51. (a) $85° 18' 30''$ (b) $330° 25''$

In Exercises 53–56, convert the angle measurement to $D° M' S''$ form.

53. (a) $240.6°$ (b) $-145.8°$

In Exercises 57–60, find the radian measure of the central angle using the given radius and arc length.

57. $r = 10$ inches, $s = 4$ inches

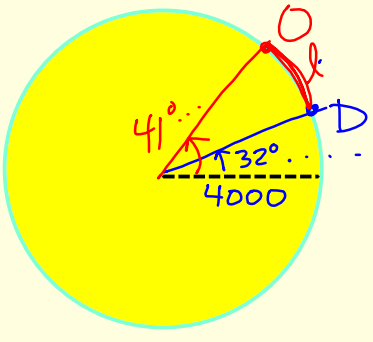
In Exercises 61–64, find the length of the arc on the circle of radius r subtended by the central angle θ.

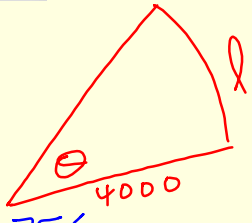
63. $r = 6$ m, $\theta = 2$ radians

In Exercises 65–68, find the distance between the two cities of given latitudes. Assume that the earth is a sphere of radius 4000 miles and that the cities are on the same meridian (one city is due north of the other).

65. Dallas 32° 47′ 9″ N
Omaha 41° 15′ 42″ N

$\ell = \theta r$





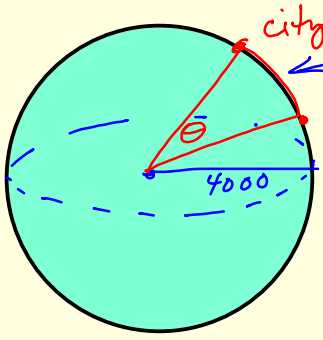
$40° \quad 75'$

$41° \quad 15' \quad 42''$

$- \quad 32° \quad 47' \quad 9''$

$\theta = 8° \; 28' \; 33'' \left(\frac{\pi}{180°}\right)$

69. Assuming that the earth is a sphere of radius 4000 miles, what is the difference in latitude of two cities, one of which is 325 miles due north of the other?



find θ

$l = \theta r$

.63 rad. → $\frac{180}{\pi}$ → DMS

.63 r → DMS

73. A car is moving at the rate of 50 miles per hour, and the diameter of each of its wheels is 2.5 feet.

(a) Find the number of revolutions per minute that the wheels are rotating.

(b) Find the *angular speed* of the wheels. radians per min

Goal

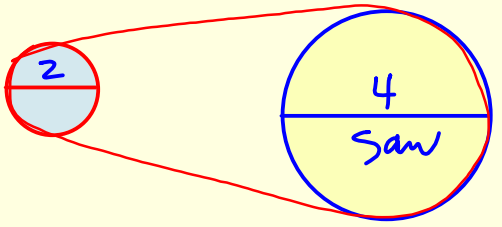
$\frac{50 \text{ miles}}{\text{hr}} \cdot$ = $\frac{\text{rev}}{\text{min}}$

multiply by conversion fractions to get

75. A 2-inch-diameter pulley on an electric motor that runs at 1700 revolutions per minute is connected by a belt to a 4-inch-diameter pulley on a saw arbor.

(a) Find the angular speed (radians per minute) of each pulley.

(b) Find the revolutions per minute of the saw.



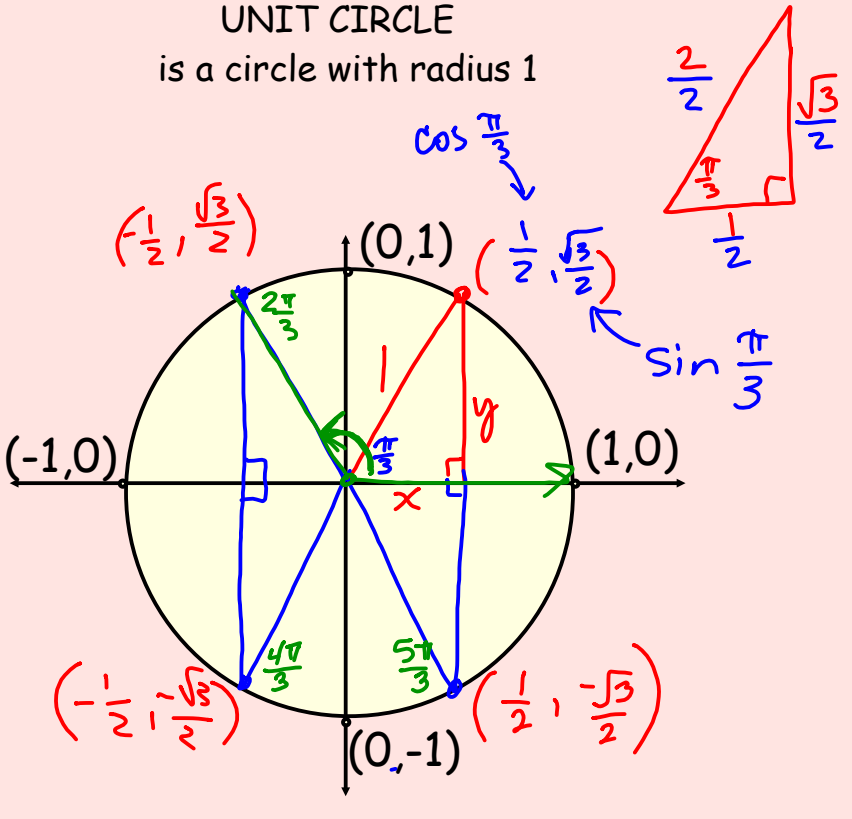
Goal

a)

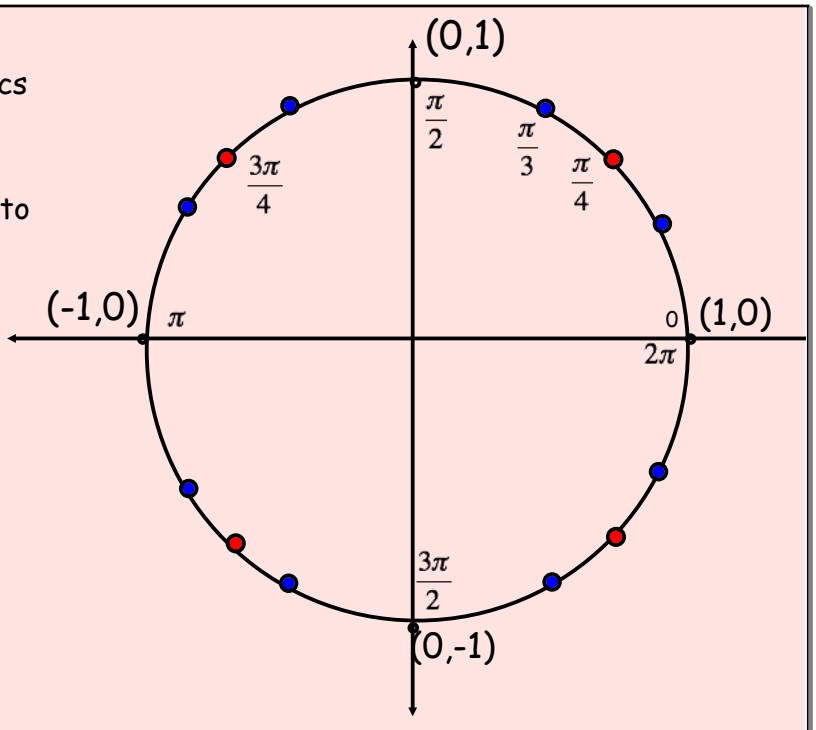
$$\frac{1700 \text{ rev}}{\text{min}} \cdot \frac{2\pi \text{ rad.}}{1 \text{ rev}} = \frac{\quad \text{rad}}{\text{min.}}$$

UNIT CIRCLE

is a circle with radius 1



place the following arcs on the unit circle which correspond to the radian angles:

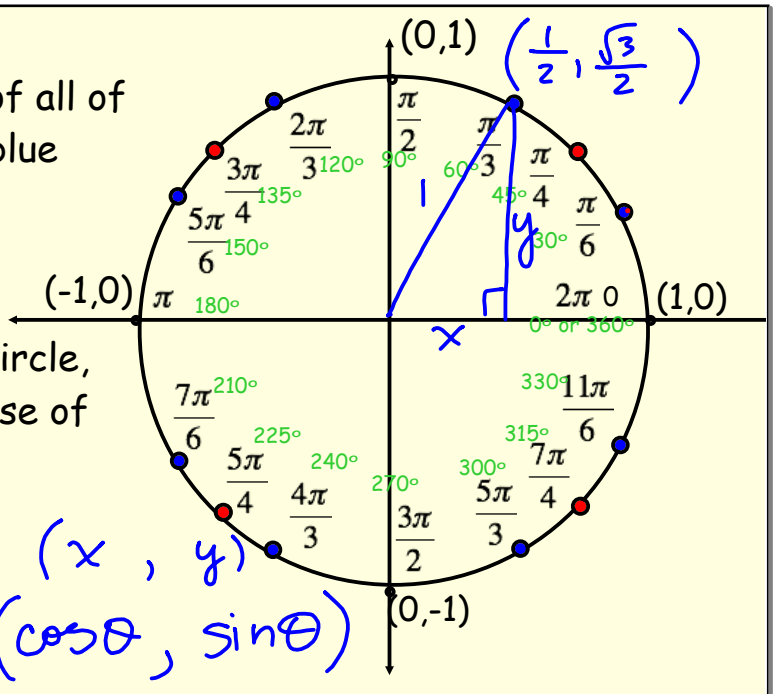


$\frac{5\pi}{4}$ $\frac{7\pi}{4}$

$\frac{2\pi}{3}$ $\frac{4\pi}{3}$ $\frac{5\pi}{3}$

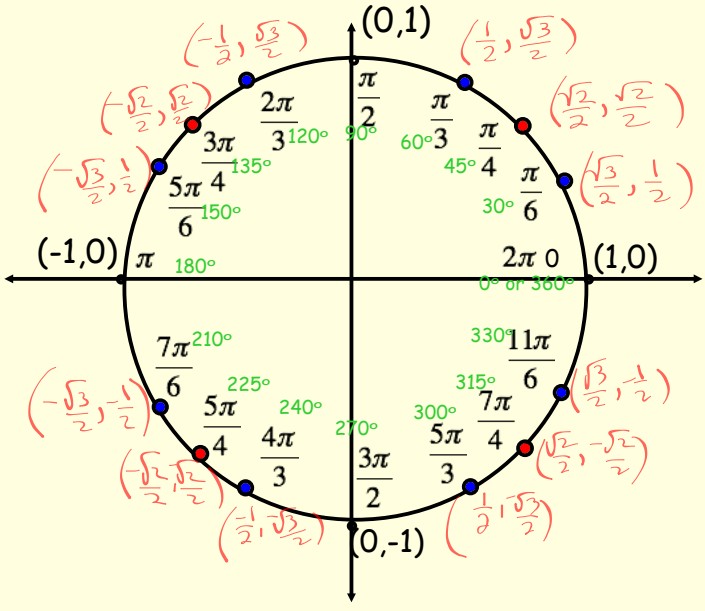
$\frac{\pi}{6}$ $\frac{5\pi}{6}$ $\frac{7\pi}{6}$ $\frac{11\pi}{6}$

Write the coordinates of all of the red and blue dots by using special triangles.
On the unit circle, the hypotenuse of these special triangles is __1__.



(x , y)

(cosθ , sinθ)

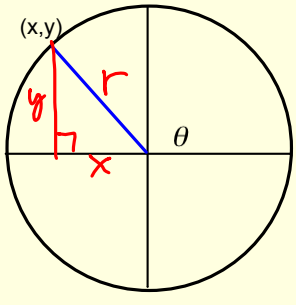


$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

The reciprocal functions:

$$\csc\theta = \frac{hyp}{opp} \qquad \sec\theta = \frac{hyp}{adj} \qquad \cot\theta = \frac{adj}{opp}$$

cosecant · secant · cotangent



$$\sin\theta = \frac{y}{r} \qquad \cos\theta = \frac{x}{r} \qquad \tan\theta = \frac{y}{x}$$

$$\csc\theta = \frac{r}{y} \qquad \sec\theta = \frac{r}{x} \qquad \cot\theta = \frac{x}{y}$$

In a unit circle, what are these?

$\sin\theta = y$ $\qquad \csc\theta = \frac{1}{y}$

$\cos\theta = x \rightarrow \sec\theta = \frac{1}{x}$

$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{x}{y}$

Find:

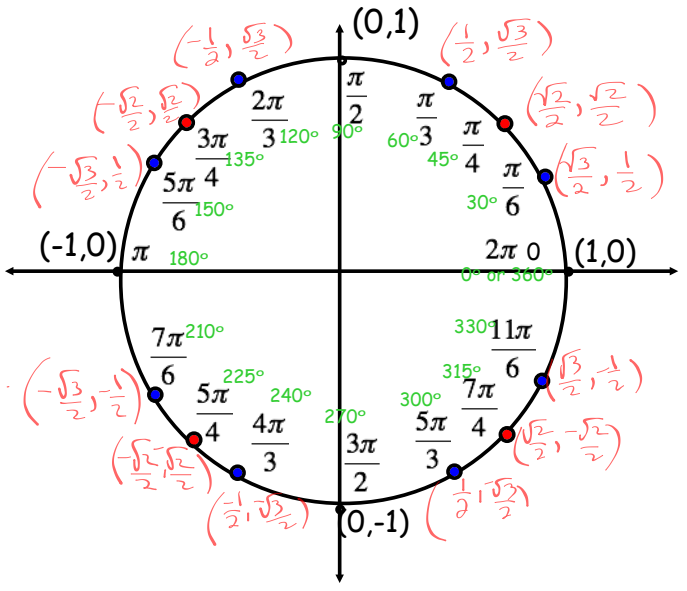
1. $\sin \frac{3\pi}{4}$

2. $\tan \frac{4\pi}{3}$

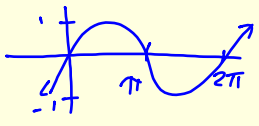
3. $\sec \frac{11\pi}{6}$

4. $\csc \pi$

5. $\cos\left(-\frac{\pi}{3}\right)$

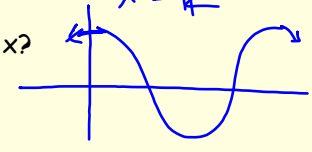


y = sin x is a function. What is the dom? range?



$x = \mathbb{R}$ $\quad -1 \le y \le 1$

What about y = cos x?



$x = \mathbb{R}$ $\quad -1 \le y \le 1$

Both of these functions are said to be PERIODIC, since $y = \sin x$ is the same as $y = \sin(x + 2\pi)$

This helps us evaluate $\sin \frac{13\pi}{6}$ and $\cos \frac{-7\pi}{2}$

$\sin\left(\frac{13\pi}{6} - \frac{12\pi}{6}\right) = \sin \frac{\pi}{6}$

Check these on your calculator!

Can you find these on your calculator?

degree mode

cot 20° = $\tan 20^\circ$ x^{-1}

≈ 2.75

radian mode

sec 0.7 = $\cos 0.7$ x^{-1}

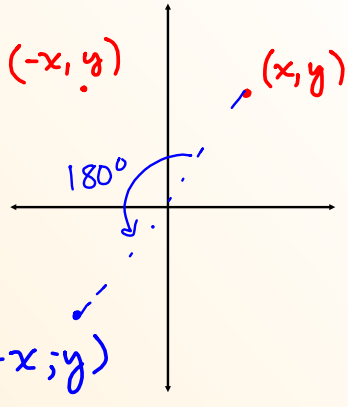
≈ 1.31

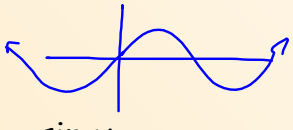
Which of the functions are even? Which are odd?

even: $f(-x) = f(x) \rightarrow r_y$

odd: $f(-x) = -f(x)$

origin symmetry





y = sin x

odd

y = cos x even

csc, sec, and cot?

HW: PC book p. 319

boxed and # 25, 33, 37

Unit Circle Quiz: Tuesday